

Response to Restriction Requirement and Species Election

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Applicant(s): BENZ et al.

Serial No.: 10/663,926

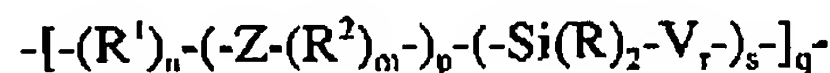
Confirmation No.: 2299

Filed: September 16, 2003

For: COMPOUNDS CONTAINING QUATERNARY CARBONS AND SILICON-CONTAINING GROUPS.
MEDICAL DEVICES, AND METHODS

CLAIMS READABLE ON THE ELECTED SPECIES

1. A medical device comprising a polymer comprising a group of the formula:



wherein:

 $n = 0 \text{ or } 1;$ $m = 0 \text{ or } 1;$ $p = 1-100,000;$ $r = 0-100,000;$ $s = 1-100,000;$ $q = 1-100,000;$

R^1 and R^2 are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

Z is $-C(R^3)_2-$ wherein each R^3 is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R^3 groups within $-C(R^3)_2-$ can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms; and

V is $-O-Si(R)_2-$ or R^1 .

2. The medical device of claim 1 wherein $p = 1-5000$.
3. The medical device of claim 2 wherein $p = 2-12$.
4. The medical device of claim 1 wherein R^1 and R^2 are each independently a straight chain alkylene group, an arylene group, or combinations thereof.

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5. The medical device of claim 4 wherein R^1 and R^2 are each independently a straight chain alkylene group.
6. The medical device of claim 1 wherein R^1 and R^2 are each independently groups containing up to 100 carbon atoms.
7. The medical device of claim 6 wherein R^1 and R^2 are each independently groups containing up to 20 carbon atoms.
8. The medical device of claim 7 wherein R^1 and R^2 are each independently groups containing 2 to 20 carbon atoms.
9. The medical device of claim 1 wherein each R^3 is independently a straight chain alkyl group, an aryl group, or combinations thereof, optionally including heteroatoms.
10. The medical device of claim 9 wherein each R^3 is independently a straight chain alkyl group, optionally including heteroatoms.
11. The medical device of claim 10 wherein each R^3 is independently a straight chain alkyl group containing 1 to 20 carbon atoms.
12. The medical device of claim 1 wherein the polymer further comprises a urethane group, a urea group, or combinations thereof.
13. The medical device of claim 12 wherein the polymer comprises a segmented polyurethane.
14. The medical device of claim 1 wherein the polymer is a biomaterial.

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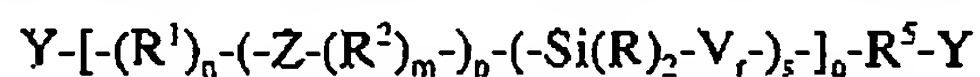
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15. The medical device of claim 14 wherein the polymer is substantially free of ether, ester, and carbonate linkages.

16. The medical device of claim 1 wherein the polymer is linear, branched, or crosslinked.

17. A medical device comprising a polymer prepared from a compound of the formula:



wherein:

each Y is independently OH or NR⁴H;

n = 0 or 1;

m = 0 or 1;

p = 1-100,000;

r = 0-100,000;

s = 1-100,000;

q = 1-100,000;

R¹, R², and R⁵ are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

Z is -C(R³)₂- wherein each R³ is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R³ groups within -C(R³)₂- can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

each R⁴ is independently H or a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof; and

V is -O-Si(R)₂- or R¹.

18. The medical device of claim 17 wherein p = 1-100.

19. The medical device of claim 18 wherein p = 2-12.

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20. The medical device of claim 17 wherein the number average molecular weight of the compound of the formula $Y-[-(R^1)_n-(-Z-(R^2)_m-)_p-(-Si(R)_2-V_r-)_s-]_q-R^3-Y$ is no greater than about 100,000 grams/mole.
21. The medical device of claim 20 wherein the number average molecular weight of the compound of the formula $Y-[-(R^1)_n-(-Z-(R^2)_m-)_p-(-Si(R)_2-V_r-)_s-]_q-R^3-Y$ is about 1000 grams/mole to about 1500 grams/mole.
22. The medical device of claim 17 wherein R^1 and R^2 are each independently a straight chain alkylene group, an arylene group, or combinations thereof.
23. The medical device of claim 22 wherein R^1 and R^2 are each independently a straight chain alkylene group.
24. The medical device of claim 17 wherein R^1 and R^2 are each independently groups containing up to 100 carbon atoms.
25. The medical device of claim 24 wherein R^1 and R^2 are each independently groups containing up to 20 carbon atoms.
26. The medical device of claim 25 wherein R^1 and R^2 are each independently groups containing 2 to 20 carbon atoms.
27. The medical device of claim 17 wherein each R^2 includes at least two carbon atoms.
28. The medical device of claim 17 wherein each R^3 is independently a straight chain alkyl group, an aryl group, or combinations thereof, optionally including heteroatoms.
29. The medical device of claim 28 wherein each R^3 is independently a straight chain alkyl group, optionally including heteroatoms.

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30. The medical device of claim 29 wherein each R³ is independently a straight chain alkyl group containing 1 to 20 carbon atoms.

31. The medical device of claim 17 wherein the polymer further comprises a urethane group, a urea group, or combinations thereof.

32. The medical device of claim 31 wherein the polymer comprises a segmented polyurethane.

33. The medical device of claim 17 wherein the polymer is a biomaterial.

34. The medical device of claim 33 wherein the polymer is substantially free of ether, ester, and carbonate linkages.

35. The medical device of claim 17 wherein each Y is OH.

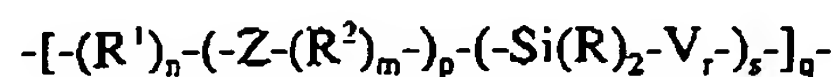
36. The medical device of claim 17 wherein each R⁴ is independently H or a straight chain alkyl group.

37. The medical device of claim 36 wherein each R⁴ is independently a straight chain alkyl group containing 1 to 20 carbon atoms.

38. The medical device of claim 36 wherein each R⁴ is H.

39. The medical device of claim 17 wherein the polymer is linear, branched, or crosslinked.

40. A polymer comprising a group of the formula:



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wherein:

 $n = 0 \text{ or } 1;$ $m = 0 \text{ or } 1;$ $p = 1-100,000;$ $r = 0-100,000;$ $s = 1-100,000;$ $q = 1-100,000;$

R^1 and R^2 are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

Z is $-C(R^3)_2-$ wherein each R^3 is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R^3 groups within $-C(R^3)_2-$ can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms; and

V is $-O-Si(R)_2-$ or R^1 .

41. The polymer of claim 40 wherein $p = 1-5000$.
42. The polymer of claim 40 wherein $p = 2-12$.
43. The polymer of claim 40 wherein R^1 and R^2 are each independently a straight chain alkylene group, an arylene group, or combinations thereof.
44. The polymer of claim 43 wherein R^1 and R^2 are each independently a straight chain alkylene group.
45. The polymer of claim 40 wherein R^1 and R^2 are each independently groups containing 2 to 20 carbon atoms.

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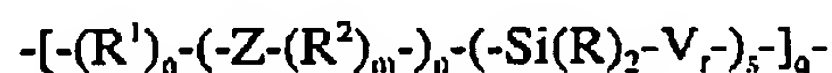
46. The polymer of claim 40 wherein each R^3 is independently a straight chain alkyl group, an aryl group, or combinations thereof, optionally including heteroatoms.

47. The polymer of claim 46 wherein each R^3 is independently a straight chain alkyl group, optionally including heteroatoms.

48. The polymer of claim 47 wherein each R^3 is independently a straight chain alkyl group containing 1 to 20 carbon atoms.

49. The polymer of claim 40 which is linear, branched, or crosslinked.

50. A polymer comprising a urethane group, a urea group, or combinations thereof, and a group of the formula:



wherein:

$n = 0$ or 1 ;

$m = 0$ or 1 ;

$p = 1-100,000$;

$r = 0-100,000$;

$s = 1-100,000$;

$q = 1-100,000$;

R^1 and R^2 are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

Z is $-C(R^3)_2-$ wherein each R^3 is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R^3 groups within $-C(R^3)_2-$ can be optionally joined to form a ring;

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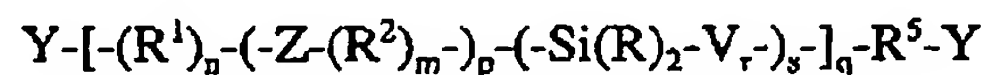
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each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms; and

V is -O-Si(R)₂- or R¹.

51. The polymer of claim 50 wherein p = 1-100.
52. The polymer of claim 51 wherein p = 2-12.
53. The polymer of claim 50 which is a segmented polyurethane.
54. The polymer of claim 50 which is a biomaterial.
55. The polymer of claim 54 which is substantially free of ether, ester, and carbonate linkages.
56. The polymer of claim 50 which is linear, branched, or crosslinked.
57. A polymer prepared from a compound of the formula:



wherein:

each Y is independently OH or NR⁴H;

n = 0 or 1;

m = 0 or 1;

p = 1-100,000;

r = 0-100,000;

s = 1-100,000;

q = 1-100,000;

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R^1 , R^2 , and R^5 are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

Z is $-C(R^3)_2-$ wherein each R^3 is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R^3 groups within $-C(R^3)_2-$ can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

each R^4 is independently H or a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof; and

V is $-O-Si(R)_2-$ or R^1 .

58. The polymer of claim 57 wherein $p = 1-100$.

59. The polymer of claim 58 wherein $p = 2-12$.

60. The polymer of claim 57 wherein the number average molecular weight of the compound of the formula $Y-[(R^1)_n-(-Z-(R^2)_m)_p-(-Si(R)_2-V_r)_s]_q-R^5-Y$ is no greater than about 100,000 grams/mole.

61. The polymer of claim 57 wherein R^1 and R^2 are each independently a straight chain alkylene group, an arylene group, or combinations thereof.

62. The polymer of claim 61 wherein R^1 and R^2 are each independently groups containing up to 100 carbon atoms.

63. The polymer of claim 62 wherein R^1 and R^2 are each independently groups containing up to 20 carbon atoms.

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64. The polymer of claim 63 wherein R^1 and R^2 are each independently groups containing 2 to 20 carbon atoms.

65. The polymer of claim 57 wherein each R^2 includes at least two carbon atoms.

66. The polymer of claim 57 wherein each R^3 is independently a straight chain alkyl group, an aryl group, or combinations thereof, optionally including heteroatoms.

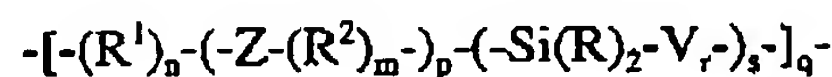
67. The polymer of claim 66 wherein each R^3 is independently a straight chain alkyl group containing 1 to 20 carbon atoms.

68. The polymer of claim 57 wherein each Y is OH.

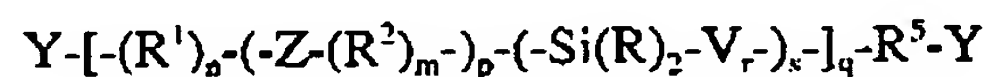
69. The polymer of claim 57 wherein each R^4 is independently H or a straight chain alkyl group.

70. The polymer of claim 57 which is linear, branched, or crosslinked.

76. A method of making a polymer comprising a group of the formula



the method comprising combining an organic compound containing two or more groups capable of reacting with hydroxyl or amine groups with a polymeric starting compound of the formula:



wherein:

each Y is independently OH or NR^4H ;

$n = 0$ or 1;

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 $m = 0 \text{ or } 1;$ $p = 1-100,000;$ $r = 0-100,000;$ $s = 1-100,000;$ $q = 1-100,000;$

R^1 , R^2 , and R^5 are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

Z is $-C(R^3)_2-$ wherein each R^3 is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R^3 groups within $-C(R^3)_2-$ can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

each R^4 is independently H or a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof; and

V is $-O-Si(R)_2-$ or R^1 .